

REMARKS

Please reconsider the application in view of the above amendments and the following remarks. Applicant thanks the Examiner for carefully considering this application.

I. Disposition of Claims

Claims 1-6, and 14-20 are pending in this application. Claims 1 and 14 are independent. The remaining claims depend, directly or indirectly, from claims 1 and 14. Claims 1 and 14 have been amended.

II. Claim Amendments

Independents claim 1 and 14 have been amended to clarify the present invention. No new matter has been added. The support in the specification for the amendments to claims 1 and 14 is discussed below.

In particular claims 1 and 14 have been amended to recite that “the anion exchange resin demineralizes raw water and the capacity of the anion exchange resin for demineralizing raw water is reduced over time.” On page 11 of the instant specification, the demineralization function of the anion exchange resin is shown, whereby an embodiment of the present invention includes “measuring the inorganic carbonic acid concentration in the outlet water of an ion exchange resin vessel of an ion exchange deionization (demineralization) system to evaluate the performance (such, for example, as reactivity and degree of degradation) of the anion exchange resin being in use in the ion exchange resin vessel.” See Specification at 11. Embodiments of the present invention also make it possible “to manage or evaluate the dynamic performance and the degree of degradation as time pass, of the anion exchange resin... Thus, the replacement timing and lifetime of the anion exchange resin can be judged, and moreover, the throughput capacity can also be judged.” *Id.* at 15. The reduction in the anion exchange resin’s capacity to

demineralize raw water is observed “as the performance of the anion exchange resin is degraded, the inorganic carbonic acid concentration in the outlet water becomes higher...” *Id.* at 19.

The above indicates clear support for claims 1 and 14 as amended. Thus, the Applicant respectfully requests entry of the amendments.

III. Rejection(s) under 35 U.S.C § 103

Claims 1-6 and 14-20 were rejected under 35 U.S.C. § 103(a) as being obvious over JP 05080009 (“Aoki”) in view of JP 09086835 (“Yoshida”). Claims 1 and 14 have been amended in this reply to clarify the present invention recited. To the extent that this rejection may still apply to the rejected claims, the rejection is respectfully traversed.

The present invention relates to a method and an apparatus for evaluating the capacity of an anion exchange resin. Claim 1 recites a method that includes measuring an inorganic carbonic acid concentration in an outlet water of an ion exchange resin vessel filled with at least an anion exchange resin, by using an electric conductivity sensor with a gas permeation membrane, thereby avoiding influences from other acid ions, and evaluating a performance of the anion exchange resin filled in said ion exchange resin vessel based on the measured inorganic carbonic acid concentration in the outlet water. Additionally, claim 1 requires that the anion exchange resin demineralizes raw water and that the capacity of the anion exchange resin for demineralizing raw water is reduced over time.

In another aspect, the present invention relates to a capacity evaluation apparatus for anion exchange resins. Claim 14 recites an apparatus that includes an outlet monitoring device for measuring an inorganic carbonic acid concentration of an outlet water of an ion exchange resin vessel filled with an anion exchange resin, by using an electric conductivity sensor with a gas permeation membrane, thereby avoiding influences from other acid ions, and an evaluation

device for evaluating a performance of the anion exchange resin filling said ion exchange resin vessel based on the measured inorganic carbonic acid concentration of the outlet water measured by said monitoring device. Furthermore, claim 14 also requires that the anion exchange resin demineralizes raw water and that the capacity of the anion exchange resin for demineralizing raw water is reduced over time.

Advantageously, embodiments of the present invention allow accurate measurement of the carbonic acid concentration in the outlet water of an ion exchange resin vessel of a demineralization system to improve the evaluation of the anion exchange resin's performance, *e.g.*, reactivity and degradation, and capacity to demineralize water. Furthermore, the inorganic carbonic acid concentration can be monitored either intermittently or continuously.

The Applicant points out that under 35 U.S.C. § 103, prior art references cannot be combined to render a claimed invention obvious by merely showing that all the limitations of the claimed invention can be found in various prior art references. Instead, there must a suggestion or motivation to combine the references within the prior art references themselves. In other words, regardless of whether prior art references can be combined, there must an indication within the prior art references *expressing desirability* to combine the references. *See In re Mills*, 916 F.2d 680 (Fed. Cir. 1990). Further, the present application *cannot be used as a guide* in reconstructing elements of prior art references to render the claimed invention obvious. *See In re Vaeck*, 947 F.2d 488 (Fed. Cir. 1991).

Yoshida teaches an evaluation of an anion exchange resin by using a performance evaluation water in the anion exchange resin after regeneration and testing for leaked sulfate ions. The leaked sulfate ions are measured by ion chromatography analysis. However, Yoshida does not teach or suggest measuring an inorganic carbonic acid concentration in an outlet water,

using an electric conductivity sensor with a gas permeable membrane for such measuring, or an outlet monitoring device for such measuring, as required by claims 1 and 14.

Aoki discloses a carbonate concentration measuring apparatus that uses an electric conductivity sensor with a gas permeation membrane. Aoki does not teach or suggest using its apparatus to evaluate the performance of an anion exchange resin as required by independent claims 1 and 14.

As discussed above, Yoshida is directed to evaluating the performance of an anion exchange resin by measuring the leaked sulfate ions. In Yoshida, there is no suggestion that the capacity of the anion exchange resin could be evaluated by measuring the inorganic carbonic acid concentration in the outlet water. Rather, sulfuric acid is a stable and suitable measure for the evaluation of the anion exchange resin. Thus, there exists no motivation to modify the prior art to include the gas permeable membrane and electric conductivity sensor of Aoki to measure an inorganic carbonic acid concentration.

Furthermore, while the Examiner states that “it would have been obvious to one having an ordinary skill in the art to use the electric conductivity sensor with a gas permeation membrane of Aoki to evaluate the performance of an anion exchange resin because the concentration of inorganic carbonic acid can be directly measured in an aqueous system,” there is no teaching of such use of carbonic acid concentration to evaluate the performance of an anion exchange resin in the cited references. If the Examiner maintains these assertions set forth in this rejection, Applicant respectfully requests that the Examiner provide documentary evidence supporting the assertions as to what is known with respect to carbonic acid measurement and the motivation to combine said knowledge to evaluating anion exchange resins. 37 C.F.R. §1.104(c)(2). See also *In re Zurko*, 258 F.3d 1379, 1385 (Fed. Cir. 2001) (“[T]he Board [or examiner] must point to some concrete evidence in the record in support of these findings” to

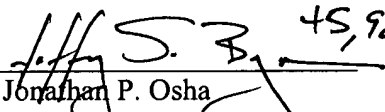
satisfy the substantial evidence test). If the Examiner is relying on personal knowledge to support the finding of what is known in the art, Applicant respectfully requests that the Examiner provide an affidavit or declaration setting forth specific factual statements and explanation to support the finding, as required under 37 C.F.R. § 1.104(d)(2).

Therefore, Yoshida and Aoki are not properly combinable in a rejection against the claimed invention as recited in independent claims 1 and 14. Further, they do not teach all of the features of the present invention. For at least this reason, independent claims 1 and 14 are patentable over Yoshida and Aoki. Dependent claims 2-6 and 15-20 are patentable for at least the same reasons. *See In re Fine*, 837 F.2d 1071 (Fed. Cir. 1988). Accordingly, withdrawal of this rejection is respectfully requested.

Applicant believes this reply is fully responsive to all outstanding issues and places this application in condition for allowance. If this belief is incorrect, or other issues arise, the Examiner is encouraged to contact the undersigned or his associates at the telephone number listed below. Please apply any charges not covered, or any credits, to Deposit Account 50-0591 (Reference Number 08228/017001).

Dated:

Respectfully submitted,

By  45,925
Jonathan P. Osha
Registration No.: 33,986
OSHA · LIANG LLP
1221 McKinney St., Suite 2800
Houston, Texas 77010
(713) 228-8600
(713) 228-8778 (Fax)
Attorney for Applicant

Attachments